# HI 83540
# Alcohol in Wine
# Meter



**HANNA**®
**instruments**
www.hannainst.com
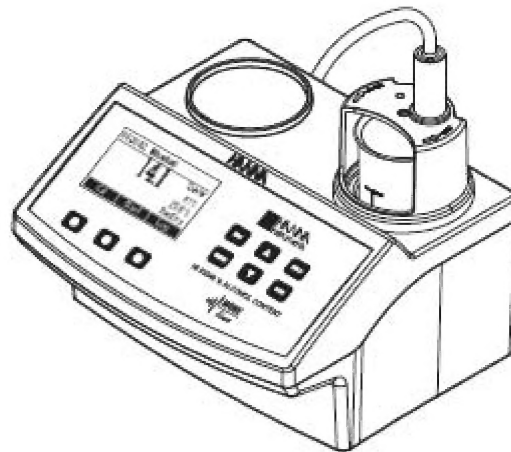
Dear Customer,

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for the correct use of the instrument. Please read it carefully before using the meter. If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com. This instrument is in compliance with CE directives.

## TABLE OF CONTENTS

### MODEL IDENTIFICATION

Two models are available:

**HI 83540-01** - 115 Vac power supply

**HI 83540-02** - 230 Vac power supply

## PRELIMINARY EXAMINATION

Please examine this product carefully. Make sure the instrument is not damaged. If any damage occurred during shipment, please notify your Dealer.

Each **HI 83540** instrument is supplied complete with:

- Reagents for 50 tests
- One 60 mL plastic syringe
- One 30 mL plastic syringe
- One 100 mL beaker
- One HI 76315 Alcohol probe
- One stir bar
- AC/DC power adapter
- Instruction manual

<u>Note</u>: Save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing.

## GENERAL DESCRIPTION

The **HI 83540** is a low cost, easy to use, alcohol meter that benefits from Hanna's years of experience as manufacturer of analytical instruments.

The instrument employs a new method to measure the alcohol content in wines that is both simple and quick. The meter takes two readings, one before the Hanna reagent is added and one after. The difference between measurements is used to calculate the alcohol content.

The meter features a user friendly graphical interface that guides the user through the procedure step by step.

At the end of the measurement, the alcohol content of the wine sample is displayed directly on the LCD.

The **HI 83540** meter utilizes a state of the art method for alcohol content determination in wine samples, suitable for anyone.

<u>SIGNIFICANCE OF USE</u>

The alcohol content is an important parameter of a wine. The first and most important criteria for classifying the wine into quality classes.

From the quality view, the alcohol content has an important role in the conservation of a wine with time.

From the sensory point of view, the alcohol content influences the power, warmth and sweetness of a wine.

The alcohol content is also used to classify wines for taxation.

The HI 83540 meter measures the alcohol content in a wine sample simply and quickly. The result is displayed in % v/v units.

## SPECIFICATIONS

| | |
|---|---|
| Range | 0.0 to 25.0 %v/v |
| Resolution | 0.1 %v/v |
| Accuracy | |
|     Fixed Sugar compensation | 0.7 %v/v for dry and medium-dry wines (less than 12 g/L sugar) |
|     Type Sugar compensation | |
|         Dry range | 0.4 %v/v (less than 4 g/L sugar) |
|         Medium-dry range | 0.4 %v/v (4 g/L..12 g/L sugar) |
|         Medium-sweet range | 0.8 %v/v (12 g/L..45 g/L sugar) |
|         Sweet range | 0.8 %v/v (45 g/L..180 g/L sugar) |
|     Sugar Content compensation | |
|         Dry range | 0.2 %v/v (less than 4 g/L sugar) |
|         Medium-dry range | 0.2 %v/v (4 g/L..12 g/L sugar) |
|         Medium-sweet range | 0.4 %v/v (12 g/L..45 g/L sugar) |
|         Sweet range | 0.4 %v/v (45 g/L..180 g/L sugar) |
| Sample volume | 60 mL |
| Temperature Compensation | 5-35 °C (41 to 95 °F) |
| Electrode | HI 76315 Alcohol probe |
| Stirring speed | 900 rpm |
| Environment | 0 to 50 °C (32 to 122 °F); max 95% RH non-condensing |
| Power supply | 12 Vdc adapter (included) |
| Dimensions | 208 x 214 x 163 mm (8.2 x 8.4 x 6.4") (with beaker) |
| Weight | 2200 g (77.6 oz.) |

<u>Note:</u> The accuracy and repeatibility of the measurements can be improved by using precise volume measuring tools (e.g.: pipette).

<u>REQUIRED REAGENTS</u>

| <u>Code</u> | <u>Description</u> | <u>Quantity/Test</u> |
|---|---|---|
| HI 83540-50 | Standard solution | 30 mL |
| HI 83540-51 | Electrode cleaning solution | 50 mL |
| HI 83540-55 | Calibration standard solution | 60 mL |

# PRINCIPLE OF OPERATION

The alcohol determination is made using a new method. The meter takes two readings, one before the Hanna reagent is added and one after. The difference between readings is used to calculate the alcohol content.

The sugar content of the wine acts as an interference. In order to eliminate the sugar content interference, the meter has a built-in algorithm for sugar content compensation. There are three types of sugar content compensation: Fixed Sugar Compensation (the same compensation for all wine types); Type Sugar Compensation (the wine type can be selected) and Sugar Content Compensation (the sugar content of a wine can be entered).

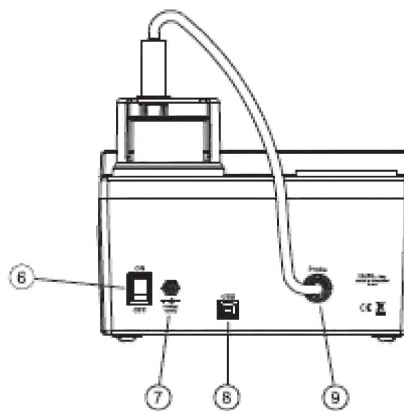# FUNCTIONAL DESCRIPTION

## INSTRUMENT DESCRIPTION
### FRONT PANEL

1) Graphic LCD
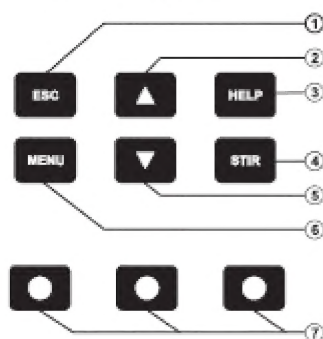2) Functional keys
3) Keypad
4) Probe holder
5) Probe
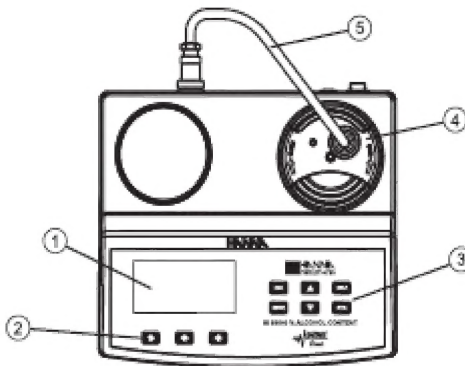


### REAR PANEL

6) Power switch
7) Power input connector
8) USB connector
9) Probe connector

## KEYPAD DESCRIPTION



1) **ESC** - to leave the current screen and to return to the previous screen. When modifying a parameter in **SETUP** mode, pressing ESC will allow you to exit without saving the changes.

2) **▲** - to modify a parameter or scroll through information from the instrument's setup

3) **HELP** - to access/leave the instrument's contextual help

4) **STIR** - to switch ON and OFF the stirrer

5) **▼** - to modify a parameter or scroll through information from the instrument's setup

6) **MENU** - to enter in menu mode

7) Virtual Keys; function changes with displayed screen.

## START UP

• Place the instrument on a flat surface. Do not place the instrument in direct sunlight.

• Connect the AC/DC adapter to a power source. Verify correct voltage and frequency is supplied. Connect cable to power input on instrument. See label on rear of instrument.

• Turn the instrument ON using the power switch on the rear panel of the instrument. Wait until main screen is displayed.

## GUIDE TO DISPLAY CODES

During the instrument's operation a series of information are displayed on the LCD.
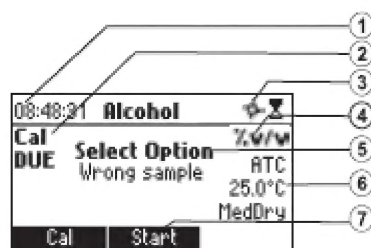


1) Current Time

2) Calibration due warning/reading status messages

3) Stirrer and reading stability status indicator

⧗ Seen when the reading is unstable.

⊥ Seen moving when the stirrer is on.

4) Measurement unit

5) Alcohol content reading/warning and error messages

6) Temperature compensation mode, current temperature, sugar compensation setting

7) Virtual key functions.

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# SETUP

To access the Setup screen press the MENU key and then the Setup functional key. While in the Setup menu it is possible to modify the instrument's parameters. Use the ▲/▼ keys to select a parameter from the menu. The Setup screen displays the current configuration. Press Modify to display available options for parameter. Press HELP to view the contextual help at any time.
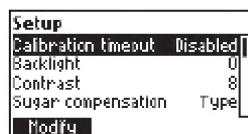
## Calibration timeout

Options: Disabled or 1 to 7 days.

This option is used to set the number of days before the "Alcohol Calibration Expired" warning message appears.

Press Modify to access the calibration timeout setting screen.
Press ▲/▼ to increase/decrease the time between calibrations. Press Accept to confirm the value or ESC to return to the Setup menu without saving change.
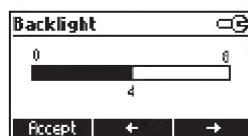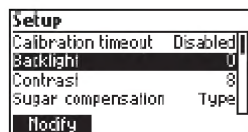
## Backlight

Options: 0 to 8.
Press Modify to access the Backlight Setup screen.

Press ▲/▼ or ←/→ in order to increase/decrease the display's backlight intensity.
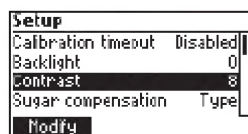Press Accept to confirm the value or ESC to return to the Setup menu without saving.

## Contrast

Options: 0 to 20.
Press Modify to access the Contrast Setup screen.

Press ▲/▼ or ←/→ in order to increase/decrease the display's contrast.
Press Accept to confirm the value or ESC to return to Setup menu without saving.

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```
┌─────────────────────────┐
│Setup              ⊏⊑    │
│Contrast              8  │
│Sugar compensation  Type │
│Wine type         Sweet  │
│Sugar content  45.180 g/L│
│  Fixed   Content        │
└─────────────────────────┘
```

## Sugar Compensation

Options: **Fixed, Type** or **Content**

Press the corresponding functional key to change the sugar compensation mode.

Press **Fixed** when the sugar information is not available for dry and medium-dry wines (sugar content less than 12 g/L). In case of wine samples with a sugar content over 12 mg/L the accuracy is affected.

Press **Type** when the wine type is known from the sugar content point of view. A wrong estimation, will affect the accuracy.

Press **Content** when the sugar content is known. A wrong estimation, will affect the accuracy.

```
┌─────────────────────────┐
│Setup              ⊏⊑    │
│Contrast              8  │
│Sugar compensation  Type │
│Wine type        MedDry  │
│Sugar content   4..12 g/L│
│MedSweet  Sweet   Dry    │
└─────────────────────────┘
```

## Wine Type

This option is available only if **Type** was selected as the **Sugar Compensation** mode and it is used to select the wine type.

Options: **Dry, MedDry, MedSweet** or **Sweet**

Press **Dry** for dry wines (1..4 g/L sugar)

Press **MedDry** for medium-dry wines (4..12 g/L sugar)

Press **MedSweet** for medium-sweet wines (12..45 g/L sugar)

Press **Sweet** for sweet wines (more than 45 g/L sugar)

```
┌─────────────────────────┐
│Setup              ⊏⊑    │
│Sugar compensation Content│
│Wine type        MedDry  │
│Sugar content     4.4 g/L│
│Temperature unit     °C  │
│  Modify                 │
└─────────────────────────┘
```

## Sugar Content

This option is available only if **Content** was selected as the **Sugar Compensation** mode and it is used to set the amount of sugar in wine.

```
┌─────────────────────────┐
│Sugar content      ⊏⊑    │
│                         │
│     ⬍4.4  g/L          │
│                         │
│  Accept                 │
└─────────────────────────┘
```

Press **Modify** to access the **Sugar Content** screen.

Press ▲/▼ to increase/decrease the value.

Press **Accept** to confirm the set sugar content.

Press **ESC** to return to the **Setup** menu without saving.

```
┌─────────────────────────┐
│Setup              ⊏⊑    │
│Wine type        MedDry  │
│Sugar content     4.4 g/L│
│Temperature unit     °C  │
│T. Compensation    ATC   │
│  °F                     │
└─────────────────────────┘
```

## Temperature Unit

Option: °C or °F.

Press the functional key in order to select the desired temperature unit.

```
┌─────────────────────────┐
│Setup              ⊏⊑    │
│Sugar content     4.4 g/L│
│Temperature unit     °C  │
│T. Compensation    ATC   │
│Date / Time     05:00:46 │
│  NoTC    MTC            │
└─────────────────────────┘
```

## Temperature compensation

Options: **ATC, NoTC** or **MTC**

Press the functional key to select the desired temperature compensation mode.

Press **ATC** for automatic temperature compensation.

Press **NoTC** if no temperature compensation is desired.

Press **MTC** for manual temperature compensation.

### Date/Time

This option is used to set the instrument's date and time.

Press **Modify** to access the date/time screen.

Press ←/→ to select the value to be modified (year, month, day, hour, minute or second) and then press ▲/▼ in order to increase/decrease the value.

Press **Accept** to confirm the new values or ESC to return to **Setup** menu without saving.

### Time format

Options: **AM/PM or 24 hours.**

Press the functional key in order to select the desired time format.

### Date format

Press **Modify** to access the date format screen.

Press ▲/▼ in order to select the desired date format. Press **Accept** to confirm the desired date format or ESC to return to the **Setup** menu without saving.

### Beep status

Options: **Enable, Disable**

This option enables/disables the beep feature.

Press the functional key in order to select the new option.

When enabled, beep sounds as a short beep every time a key is pressed or when the reading must be confirmed.

A long beep alerts that the pressed key is not active.

### Language

Options: **English, Español, Français, Italiano, Português**

This option is used to change the instrument's display language.

Press **Modify** to access the language screen.

Press ▲/▼ in order to select the desired language. Press **Accept** to confirm the new language or ESC to return to Setup menu without saving. If the new selected language cannot be loaded, the previously selected language will be kept.

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| Setup | |
|---|---|
| Beep On | ☐ |
| Language | English |
| **Instrument ID** | **0000** |
| Meter information | |
| **Modify** | |

| Setup | |
|---|---|
| Beep On | ☐ |
| Language | English |
| Instrument ID | 0000 |
| **Meter information** | |
| **Select** | |

| HI 83540 Meter Info | |
|---|---|
| Firmware | 1.00 |
| Language | 4.0 |
| Fact CAL Date | 2006/01/01 |
| Fact CAL Time | 01:01:08 |

**Instrument ID**

Option: 0 to 9999.

This option is used to set the instrument's ID. The instrument ID is used while exchanging data with a PC.

**Meter information**

Press **Select** to view meter information details.

The firmware version, language version, alcohol and temperature factory calibration date and time are displayed. Press ESC to return to the previous screen.

## GLP screen

| Last Alcohol cal |
|---|
| Date: 2006/01/01 |
| Time: 06:49:39 |
| Cal Expire: Disabled |

Press GLP to view the details from the last user calibration: date, time and Cal. Expire time if this option was selected in **Setup**.
If there was no user calibration the message "**Not Calibrated**" appears instead.

## Recall screens

| Alcohol | Date |
|---|---|
| 1  9.2 %v/v | 2006/01/01 |
| 2  9.2 %v/v | 2006/01/02 |
| 3  7.1 %v/v | 2007/05/02 |
| 4 11.8 %v/v | 2007/05/02 |
| Delete All | Delete | More |

| Delete Record? | |
|---|---|
| 1  9.2 %v/v | 2006/01/01 |
| 2  9.2 %v/v | 2006/01/02 |
| 3  7.1 %v/v | 2007/05/02 |
| 4 11.8 %v/v | 2007/05/02 |
| **CFM** | |

| Delete all records? | |
|---|---|
| 1  9.2 %v/v | 2006/01/01 |
| 2  9.2 %v/v | 2006/01/02 |
| 3  7.1 %v/v | 2007/05/02 |
| 4 11.8 %v/v | 2007/05/02 |
| **CFM** | |

| Record number: 1 | |
|---|---|
| 2006/01/01 | 23:29:21 |
| Alcohol: 9.2%v/v | ATC |
| Sugar compensation: Type | |
| Wine type: MedSweet | |
| Sugar content: 12.45 g/L | |

| Results |
|---|
| **No Records!** |

Displays the list of all the logged results. This list includes the record's number, the alcohol value, the unit and the date. Press ▲/▼ to highlight the stored records.

Press **Delete** to erase the currently selected record from the instrument's memory. After pressing **Delete** the instrument will ask for confirmation. Press **CFM** to delete the record or ESC to return to the previous screen without deleting.
Deleting a record will reorganize the list.

Press **Delete All** to erase all the stored records. After pressing **Delete All** the instrument will ask for confirmation. Press **CFM** to delete all the records or ESC to return to the previous screen without deleting.

Press **More** to view the selected record's details: date & time, alcohol content value, sugar compensation type, wine type, sugar content and temperature compensation mode. To return to the previous screen press ESC.

If the log is empty the message "**No Records!**" will be displayed.

# TIPS FOR AN ACCURATE MEASUREMENT

The instructions below should be followed carefully to ensure the best possible accuracy.

- Rinse the electrode with distilled or deionized water between samples, and blot dry with a lab wipe or other soft absorbent toweling.

- Select the appropriate sugar compensation in Setup (more accurate knowledge of wine sugar content, will yield better accuracy for alcohol content determination).

- Clean the Alcohol probe regularly. Place the alcohol probe in 50 mL of **HI 83540-51** cleaning solution and stirr for about 5-10 minutes after 10-15 measurements and always before calibration.

- When dosing wine or reagent with the syringe use the following procedure:
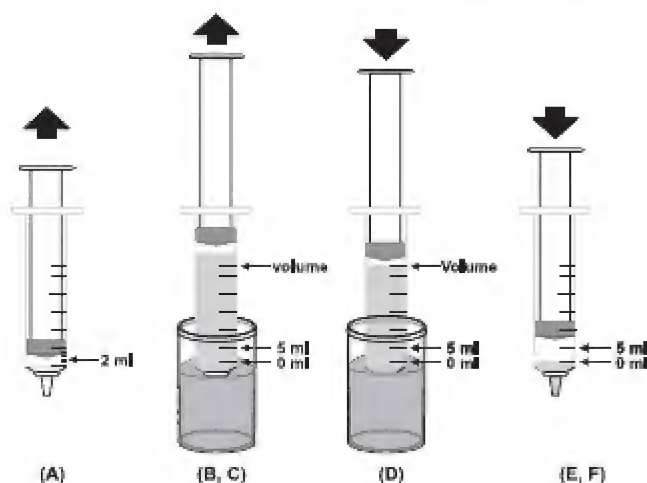


A) Move the plunger up to 2 mL position.

B) Immerse the syringe in solution while keeping it in vertical position.

C) Pull the plunger up until the solution level is over the mark that corresponds to the dosing volume plus about 5 mL. Shake the syringe if any air bubbles are present in the sample.

D) Push the plunger down until the lower edge of the sample reaches the mark that corresponds exactly to the dosing volume.

E) Move the syringe above the beaker.

F) Dose the volume pushing the plunger down until the lower edge of the sample reaches the 0 mL mark.

# CALIBRATION PROCEDURE

- Turn the instrument ON by pressing the ON/OFF switch.
- When "Select option" message is displayed on the LCD, the instrument is ready. The current time appears on the upper left side of the LCD.
- Press the Cal button to initiate the calibration procedure.

Note: A calibration is recommended before starting a new series of measurements.

- Use the 60 mL syringe to add 60 mL of HI 83540-55 calibration solution to the beaker. Follow the procedure described in the "TIPS FOR AN ACCURATE MEASUREMENT" section.

- Place a stir bar in the beaker, immerse the clean dry probe and close the cap. Dislodge air bubbles that may adhere the inside of the probe.

  Note: Make sure to remove the protective rubber ring between the yellow body and the glass before using.
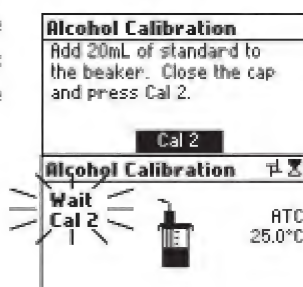
- Press Start and the calibration sequence will start.

- Press the Cal1 button. When the "Wait Cal1" message window is blinking the meter is measuring. When the reading is stable the Cal2 button appears.

- If the "Wrong standard" message is displayed the calibration procedure at Step 1 is outside the expected range. Press Cal1 to repeat the reading. Press ESC to return to the main screen, change the standard and repeat the calibration procedure.

- If the sample measurement failed to stabilize within 2 minutes the following warning message is displayed: "Unstable reading". Verify sensor is submersed in sample and plugged in rear of instrument. Press Cal1 to repeat the reading. Press ESC to return to the main screen.
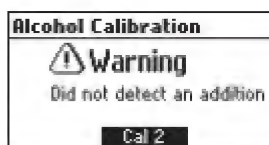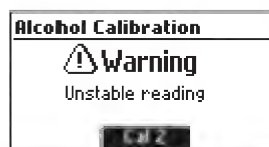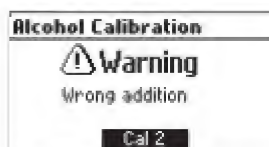
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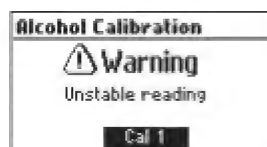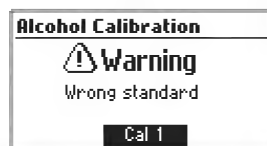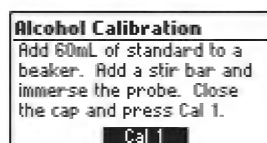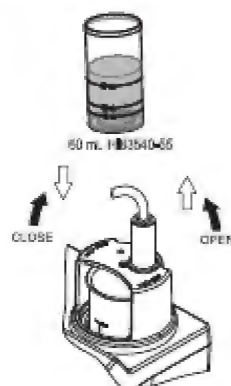
- Add 20 mL of HI 83540-50 Standard Solution, with the 30 mL syringe, to the beaker using the procedure described in the "TIPS FOR AN ACCURATE MEASUREMENT" section.

- Once the standard solution is added, remove the probeholder from the meter and reattach it. This facilitates mixing.

- Press the **Cal2** button. When the "**Wait Cal2**" message is blinking the meter is measuring. When the reading is stable the second step is successfully completed and the meter automatically returns to the main screen.

```
Alcohol Calibration
Add 20mL of standard to
the beaker. Close the cap
and press Cal 2.

         Cal 2
```

```
Alcohol Calibration          ⊭ ⊠
Wait
Cal 2                           ATC
                                25.0°C
```

- The "**Wrong addition**" message is displayed if the added standard solution is not correct or the dosed volume is wrong. Press **Cal2** to repeat the reading. Press **ESC** to return to the main screen and repeat the calibration procedure.

```
Alcohol Calibration
    ⚠Warning
   Wrong addition

         Cal 2
```

- If the sample measurement failed to stabilize within 2 minutes the following warning message is displayed: "**Unstable reading**". Verify sensor is submersed in sample and plugged in rear of instrument. Press **Cal2** to repeat the reading. Press **ESC** to return to the main screen.

```
Alcohol Calibration
    ⚠Warning
   Unstable reading

         Cal 2
```

- If the standard solution was not added the following warning message is displayed: "**Did not detect an addition**". Add the standard solution and press **Cal2**.

```
Alcohol Calibration
    ⚠Warning
  Did not detect an addition

         Cal 2
```

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# MEASUREMENT PROCEDURE

- Turn the instrument ON by pressing the ON/OFF switch.
- When "Select option" message is displayed on the LCD, the instrument is ready. The current time appears on the upper left side of the LCD.

**Warning:** Before starting a measurement make sure that the proper temperature and sugar compensation methods are selected. This can be done by entering the SETUP menu.
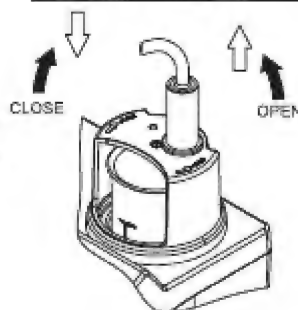
- Press the START button to start measuring.

- Use the 60 mL syringe to add 60 mL of wine to the beaker. Follow the procedure described in the "TIPS FOR AN ACCURATE MEASUREMENT" section.
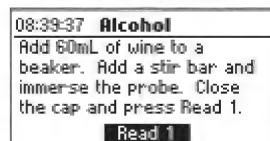
- Place a stir bar in the beaker, immerse the clean dry probe and close the cap. Dislodge air bubbles that may adhere to the inside of the probe.
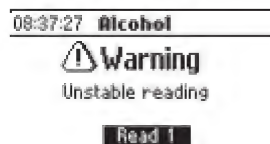
- Press the Read1 button. When the "Wait Read1" message window is blinking the meter is measuring. When the reading is stable the Read2 button appears.

- If the "Wrong sample" message is displayed the reading made at Step 1 is outside the expected range. Press Read1 button to repeat the reading. Press ESC to return to the main screen and repeat the procedure.
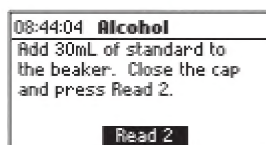
- If the sample measurement failed to stabilize within 2 minutes the following warning message is displayed: "Unstable reading". Verify sensor is submersed in sample and plugged in rear of instrument. Press Read1 to repeat the reading. Press ESC to return to the main screen.



08:37:53 **Alcohol**
**Cal DUE** **Select Option** ATC 25.0°C MedDry
Cal | Start



60 mL WINE SAMPLE

08:39:37 **Alcohol**
Add 60mL of wine to a beaker. Add a stir bar and immerse the probe. Close the cap and press Read 1.
Read 1



CLOSE | OPEN

08:39:08 **Alcohol**
Wait Read 1 | ATC 31.0°C MedDry

08:39:26 **Alcohol**
⚠ **Warning**
Wrong sample
Read 1

08:37:27 **Alcohol**
⚠ **Warning**
Unstable reading
Read 1

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- Add 30 mL of HI 83540-50 Standard solution with the 30 mL syringe to the beaker using the procedure described in the "TIPS FOR AN ACCURATE MEASUREMENT" section.

- Once the standard solution is added, remove the probe holder from the meter and reattach it. This facilitates mixing.
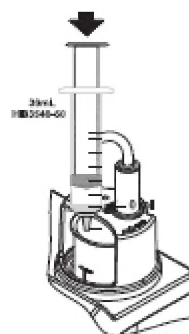
- Press the **Read2** button.
  "**Wait Read2**" will blink on the LCD. After the reading was taken the instrument displays the alcohol content on the LCD.

<u>Note</u>: Better measurement accuracy can be obtained if a precise dosing tool such as volumetric pipettes are used for sample and standard additions (instead of the syringes).

- The "**Wrong addition**" message is displayed if the added standard solution is not correct or the dosed volume is wrong. Press **Read2** to repeat the reading. Press ESC to return to the main screen and repeat the calibration procedure.

- If the sample measurement failed to stabilize within 2 minutes the following warning message is displayed: "**Unstable reading**". Verify sensor is submersed in sample and plugged in rear of instrument. Press **Read2** to repeat the reading. Press ESC to return to the main screen.

- If the standard solution was not added the following warning message is displayed: "**Did not detect an addition**". Add the standard solution and press **Read2**.
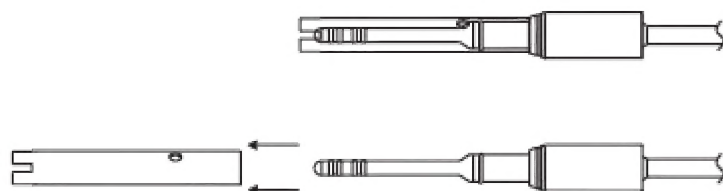
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# PROBE CONDITIONING & MAINTENANCE

## MEASURE

Rinse the probe with distilled or deionized water between measurements and blot dry with a lab wipe. For a faster response and to avoid cross-contamination of the samples, rinse the probe with a few drops of the solution to be tested, before taking measurements. Immerse the probe in the sample and stir for a few sencods.

## PERIODIC MAINTENANCE

Inspect the probe and the cable. The cable used for connection to the instrument must be intact and there must be no points of broken insulation on the cable. Connectors must be perfectly clean and dry. After 10-15 measurements and before performing a calibration, clean the electrode with **HI 83540-51** electrode cleaning solution. Soak the electrode in 50 ml of **stirred HI 83540-51** for 5-10 minutes.

If more cleaning is required, remove the probe sleeve and clean the probe with a cloth or a nonabrasive detergent. Make sure to reinsert the sleeve onto the probe properly and in the right direction. After cleaning the probe, recalibrate the instrument.

The platinum rings are supported on a breakage glass stem. Take great care while handling the probe.

## ACCESSORIES

REAGENTS

| | |
|---|---|
| HI 83540-50 | Standard solution (3 X 500 mL) |
| HI 83540-51 | Electrode cleaning solution (230 mL) |
| HI 83540-55 | Calibration solution (230 mL) |

OTHER ACCESSORIES

| | |
|---|---|
| HI 76315 | Alcohol probe |
| HI 731319 | Stir bar (10 pcs.) |
| HI 740035 | Beaker 100 mL (10 pcs.) |
| HI 740225 | 60 mL syringe |
| HI 740235 | 30 mL syringe bar |
| HI 92000 | Windows compatible software |
| HI 710005 | Voltage adapter from 115V to 12 Vdc (USA plug) |
| HI 710006 | Voltage adapter from 230V to 12 Vdc (European plug) |
| HI 710012 | Voltage adapter from 240V to 12 Vdc (UK plug) |
| HI 710013 | Voltage adapter from 230V to 12 Vdc (South Africa plug) |
| HI 710014 | Voltage adapter from 230V to 12 Vdc (Australia plug) |

## WARRANTY

HI 83540 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to the instructions.

This warranty is limited to repair or replacement free of charge.

Damage due to accident, misuse, tampering or lack of prescribed maintenance is not covered.

If service is required, contact your dealer. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a **Returned Goods Authorization Number** from the **Customer Service Department** and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

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**www.hannainst.com**.